

REMARKS

The Final Office Action mailed June 4, 2003, has been received and reviewed. Claims 1, 3, 5, 7 through 18, 20 through 26, 44 through 55, 66, and 67 are currently pending in the application. Claims 66 and 67 have been allowed. Claims 7, 9, 20, 21, and 23 are withdrawn from consideration as being drawn to non-elected invention(s). Claims 1, 3, 5, 8, 10 through 13, 15 through 18, 22, 24, 26, and 44 through 55 stand rejected. Claims 14 and 25 have been objected to as being dependent upon rejected base claims, but the indication of allowable subject matter in such claims is noted with appreciation. Applicant has amended drawing FIG. 4 and paragraph [0044] of the specification, and respectfully requests reconsideration of the application as amended herein.

Objection to Specification (Title)

The title of the invention has been objected to as being "not descriptive". The title has been previously amended as required by the Examiner in the Office Action mailed December 18, 2002. Accordingly, Applicant respectfully submits that the title, as previously amended, is sufficiently descriptive of the claimed invention. If the objection to the title is maintained, Applicant respectfully requests that the Examiner describe with specificity the nature of the objection such that the Examiner's concerns may be directly addressed.

Drawings

The drawings stand objected to under 37 CFR 1.83(a), in that they "must show every feature of the invention specified in the claims." The Examiner has objected to the drawings because "the aperture of a frustoconical configuration decreasing in size towards the sheet of resilient material must be shown." (Office Action mailed June 4, 2003, at Page 2, ¶ 2.) Applicant respectfully submits that the aperture of frustoconical configuration decreasing in size towards the sheet of resilient conductive material is shown in the original FIG. 4 by broken lines 123' and is described in the as-filed specification at paragraph [0044]. Accordingly, Applicant submits that the drawings presently show every feature of the invention specified in the claims.

Nevertheless, Applicant submits herewith drawing corrections intended to eliminate any confusion regarding the frustoconical configuration of the claimed aperture. Specifically, Applicant has amended FIG. 4 to more clearly depict aperture 123' in solid cross-section. The attached replacement drawing, which includes changes to FIG. 4, replaces the previous drawing sheet submitted for FIG. 4. An annotated sheet showing changes marked in red is also attached.

35 U.S.C. § 112 Claim Rejections

Claims 46, 49, 52, and 55 stand rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. Applicant respectfully traverses this rejection, as hereinafter set forth.

Applicant respectfully submits that claims 46, 49, 52, and 55 are presently supported by the as-filed specification and particularly point out and distinctly claim the subject matter which Applicant regards as the invention. As discussed above, however, Applicant has amended FIG. 4 of the drawings to more clearly depict aperture 123' in solid cross-section. Applicant has also amended paragraph [0044] of the specification to reflect the changes made to FIG. 4.

In view thereof, Applicant respectfully submits that claims 46, 49, 52 and 55 are allowable under the provisions of 35 U.S.C. § 112, second paragraph.

35 U.S.C. § 103(a) Obviousness Rejections

Obviousness Rejection Based on U.S. Patent No. 5,173,055 to Grabbe in View of U.S. Patent No. 5,602,422 to Schueller et al.

Claims 1, 3, 5, 8, 10 through 13, and 44 through 52 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Grabbe (U.S. Patent No. 5,173,055) in view of Schueller et al. (U.S. Patent No. 5,602,422). Applicant respectfully traverses this rejection, as hereinafter set forth.

M.P.E.P. 706.02(j) sets forth the standard for a Section 103(a) rejection:

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Yueck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). (Emphasis added).

The 35 U.S.C. § 103(a) obviousness rejections of claims 1, 3, 5, 8, 10 through 13, and 44 through 52 are improper because they fail to establish a *prima facie* case of obviousness.

Turning to the cited references, Grabbe discloses an area array connector for electrically connecting two electronic devices. The connector comprises a number of contact elements 10 formed from a sheet of material 12 (Fig. 1). Each contact element 10 includes a pair of upwardly biased contact fingers 18 extending from one side and a pair of legs 22 extending from an opposite side (col. 2, lines 3-8). In one disclosed embodiment, a film of insulating material 26 is adhered to the surface of contact elements 10 to form a contact laminate 32 (Fig. 3). Contact laminate 32 is secured to a circuit board 40 by soldering legs 22 of contact elements 10 to contact pads 47 of plated vias 46 in circuit board 40 (col. 2, lines 49-56). Grabbe discloses that the connector functions by electrically engaging contact fingers 18 of contact elements 10 with contact pads 53 on a second circuit board 48 (Fig. 9).

Schueller et al. teaches a flexible circuit construction 10 designed to reduce fatigue stresses in ball grid array solder joints during thermal cycling. Fig. 4 of Schueller et al. shows that the circuit construction comprises a polymeric sheet 12 having a layer of metal 14 defining signal traces 16 (col. 2, lines 31-36). An integrated circuit is attached to signal traces 16 by conventional means such as wire bonding, thermal compression bonding or flip chip techniques (col. 2, lines 42-46). The assembly is attached to a conventional printed circuit board by means of solder balls 24 soldered to cantilevered ends 30 of signal traces 16 (col. 2, lines 47-51 and col. 3, lines 3-7). In this manner, the configuration of solder balls 24 and cantilever ends 30 allows

the solder balls 24 to move in the vertical and horizontal directions to accommodate thermal effects and misalignments (col. 3, lines 29-35).

The Office indicates it would be obvious to combine the layer of metal 14 in Schueller et al. having signal traces 16 and cantilevered ends 30 with the device of Grabbe "for the purpose of providing increased flexibility." (Office Action mailed June 4, 2003, Page 4.) Applicant respectfully submits that there is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify or combine reference teachings in this manner.

The contact elements of Grabbe are part of an area array connector 42, 50 having contact fingers 18 for separable engagement to an electronic device or circuit board (FIG. 9 and col. 1, lines 12-14 and col. 2, lines 53-56). The cantilevered ends 30 of signal traces 16 taught by Schueller et al., on the other hand, are soldered to solder balls 24 which are intended for permanent attachment to a circuit board (col. 2, lines 49-54). Due to the differences in structure and function between these references, it would not be obvious to one of ordinary skill in the art to combine the two. Furthermore, the Office has not described how the components of Schueller et al. would be incorporated into the device of Grabbe other than "for the purpose of providing increased flexibility." If it is the Office's assertion that signal traces 16 of Schueller et al. would replace contact elements 10 in Grabbe, Applicant respectfully submits that they would not increase flexibility, as signal traces 16 would still have to be connected to plated vias 46 on circuit board 40.

In view of the above, there is no suggestion or motivation to combine the references as presented. Rather, Applicant respectfully submits that the Office has impermissibly employed hindsight reasoning by using the applicant's disclosure as a blueprint to reconstruct the claimed invention out of isolated teaching of the prior art. See, e.g., Grain Processing Corp. v. American-Maize Prods. Co., 5 U.S.P.Q.2d 1788, 1792 (Fed. Cir. 1988).

Even if Grabbe could somehow be modified to include the flexible circuit assembly 10 of Schueller et al., the resulting assembly would not teach or suggest all of the limitations of the rejected claims. Independent claims 1 and 3 recite the limitation of plurality of vias disposed in

the claimed substrate, wherein each via comprises "a recess into which one of said plurality of electrically isolated spring-biased electrical contacts may be deflected." Claim 5 also recites the limitation of at least one via in the substrate "aligned with said at least one spring-biased electrical contact such that said at least one spring-biased electrical contact may be deflected into said at least one via." Neither of the references, alone or in combination, teach or suggest this limitation. Instead, plated vias 46 in Grabbe are clearly depicted as being smaller than contact fingers 18 (see FIG. 9) and Schueller et al. does not even teach vias formed in a substrate underlying signal traces 16.

In view of the foregoing, Applicant respectfully submits that independent claims 1, 3 and 5 are allowable over Grabbe and Schueller et al. under the provisions of 35 U.S.C. § 102(b). Claims 8, 10 through 13, and 44 through 52, which depend from and incorporate all of the limitations of claims 1, 3 and 5, are allowable for the same reason.

Further, claim 12 recites that "said layer of resilient conductive material comprises a layer of sputtered or CVD material." Applicant respectfully submits that claim 12 is not a product-by-process claim as asserted by the Office, but instead recites structural characteristics of the material comprising the layer of resilient conductive material. Claim 13 recites the additional limitation of "at least one contact element disposed on said surface of said at least one spring-biased electrical contact and configured to remove or puncture through a layer of contaminants formed on an exterior surface of a lead element." Claims 45, 48 and 51 recite the limitation of a dielectric layer over the resilient conductive material "of sufficient thickness to encompass at least a portion of each lead element of an integrated circuit device." Claims 46, 49 and 52 recite that the apertures in the dielectric layer "are of a frustocoinal configuration *decreasing in size towards said layer [or sheet] of resilient conductive material.*" (Emphasis added.) The cited references also fail to describe these limitations, and claims 12, 13, 45, 46, 48, 49, 51 and 52 are allowable for that reason, as well.

Obviousness Rejection Based on U.S. Patent No. 5,173,055 to Grabbe in View of U.S. Patent No. 5,602,422 to Schueller et al., and Further in View of U.S. Patent No. 5,829,988 to McMillan et al.

Claims 15 through 18, 22, 24, 26, and 53 through 55 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Grabbe (U.S. Patent No. 5,173,055) in view of Schueller et al. (U.S. Patent No. 5,602,422), and further in view of McMillan et al. (U.S. Patent No. 5,829,988). Applicant respectfully traverses this rejection, as hereinafter set forth.

The 35 U.S.C. § 103(a) obviousness rejections of claims 15 through 18, 22, 24, 26, and 53 through 55 are improper because the cited references fail to establish a *prima facie* case of obviousness.

McMillan et al. is directed to a socket assembly for an integrated circuit chip carrier package, and is combined with Grabbe and Schueller et al. to provide the teachings of an integrated circuit device 14 disposed on a first surface of a substrate and a clamping device 16. (See McMillan et al. at Figures 2 and 3A.) Applicant respectfully submits that none of the cited references, alone or as combined, teach nor suggest all the limitations of claims 15 through 18, 22, 24, 26, and 53 through 55.

As previously discussed with respect to the rejection of claims 1, 3, 5, 8, 10 through 13, and 44 through 52, there is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify or combine Grabbe and Schueller et al. as presented. The combination of the references with McMillan et al. fails to overcome this lack of motivation.

Furthermore, Claim 15 also recites the limitations of a plurality of vias, wherein each via is “positioned at a location underlying one spring-biased electrical contact of said plurality of spring-biased electrical contacts” and “at least one integrated circuit device electrically contacting one spring-biased electrical contact of said plurality of spring-biased electrical contacts and downwardly deflecting said one spring-biased electrical contact into one via of said plurality of vias.”

For the same reasons as described above, Applicant respectfully submits that the

combination of Grabbe and Schueller et al. fails to describe, expressly or inherently, vias comprising recesses into which the spring-biased electrical contacts may be deflected. The combination with McMillan et al. also fails to teach or suggest these limitations.

In view of the foregoing, Applicant respectfully submits that independent claim 15 is allowable over the combination of Grabbe, Schueller et al. and McMillan et al. under the provisions of 35 U.S.C. § 103(a). Claims 16 through 18, 22, 24, 26, and 53 through 55, which depend from claim 15, are also allowable. If an independent claim is nonobvious under 35 U.S.C. 103, then any claim depending therefrom is nonobvious. *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988).

Further, claim 26 recites that a second surface of said substrate includes “a second layer of resilient conductive material”; “a second plurality of spring-biased electrical contacts for in said second layer”; “a second plurality of conductive traces formed in said second layer”; and, at least another integrated circuit device disposed on said second surface.” Claim 54 recites the limitation of a dielectric layer over the resilient conductive material “of sufficient thickness to encompass at least a portion of each lead element of said at least one integrated circuit device.” Claim 55 recites that the apertures in the dielectric layer “are of a frustoconical configuration decreasing in size towards said layer of resilient conductive material.” (Emphasis added.) The cited references also fail to describe these limitations, and claims 26, 54 and 55 are allowable for that reason, as well.

Objections to Claims 14 and 25/Allowable Subject Matter

Claims 14 and 25 stand objected to as being dependent upon rejected base claims, but are indicated to contain allowable subject matter and would be allowable if placed in appropriate independent form. Applicant respectfully submits that claims 14 and 25 are allowable in their present form.

ENTRY OF AMENDMENTS

The amendments to specification and drawings should be entered by the Examiner because the amendments are supported by the as-filed specification and drawings and do not add any new matter to the application.

CONCLUSION

Claims 1, 3, 5, 7 through 18, 20 through 26, 44 through 55, 66, and 67 are believed to be in condition for allowance, and an early notice thereof is respectfully solicited. Should the Examiner determine that additional issues remain which might be resolved by a telephone conference, he is respectfully invited to contact Applicant's undersigned attorney.

Respectfully submitted,



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TITLE: SUBSTRATE WITH CONTACT
ARRAY AND SUBSTRATE ASSEMBLIES

Inventor: Robert L. Canella

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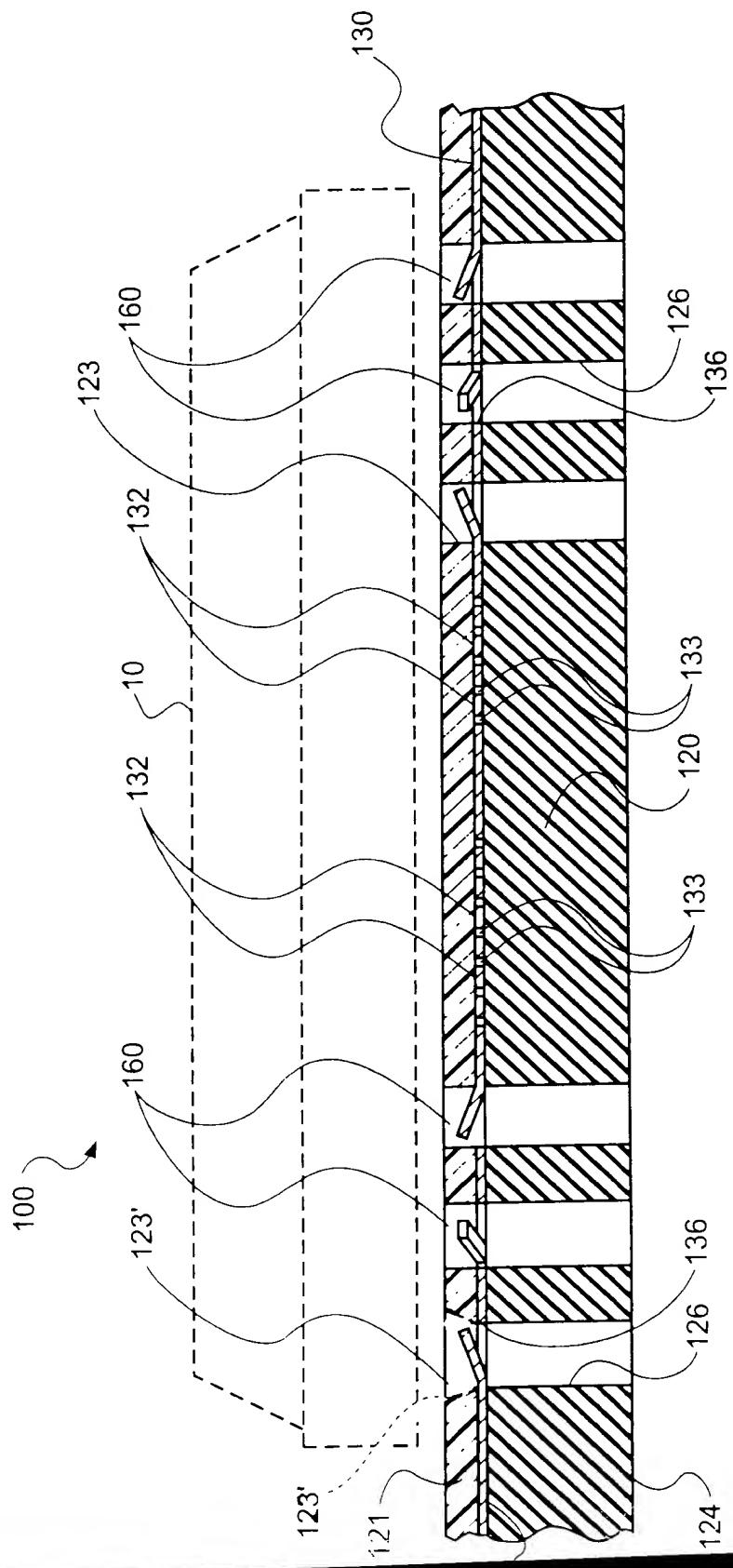


FIG. 4